Welcome to the TEINA Advisory Group Meeting #3

To maximize our time together, we will utilize the meeting procedures below.

- WebEx meeting lines will open 5 minutes ahead of start time to allow participants to log-in early and be connected by meeting time.
- At the beginning of each session, please type your name in the chat box to "sign-in" to the meeting.
- Meetings will be recorded for note-taking purposes.
- Mute phones when not speaking to help reduce excess background noise.
- During conversations, please feel free to use the chat box to ask questions and provide comments in addition to verbal comments.
Agenda

- Welcome
- Modeling Results Highlights
- Listening Sessions Summary
- Policy Orientation
- Small Group Breakouts
- Public Comment
- Next Steps
WebEx Navigation

Mute Unmute

Start/Stop Video

Share Screen

Leave Meeting

View Participants

Send a Chat

Raise your Hand
Roll Call Introductions – AG Members

Amanda Pietz, ODOT
Greg Alderson, PGE
Thomas Ashley, Greenlots
Philip Barnhart, Emerald Valley EV Assoc.
Chris Chandler, Central Lincoln PUD
Marie Dodds, AAA
Judge Liz Farrar, Gilliam County
Ingrid Fish, City of Portland
Stu Green, City of Ashland

Jamie Hall, General Motors
Zach Henkin, Cadeo Group
Joe Hull, Mid-State Electric Cooperative
Juan Serpa Muñoz, EWEB
Vee Paykar, Climate Solutions
Cory Scott, PacifiCorp
Jairaj Singh, Unite Oregon
Charlie Tracy, Oregon Trail Electric Co-op
Dexter Turner, OpConnect
Roll Call Introductions – Project Team

Mary Brazell, ODOT
Zechariah Heck, ODOT
Jessica Reichers, ODOE
Wayne Kittelson, Kittelson
Chris Bame, Kittelson
Stacy Thomas, HDR
Alexander Nelson, HDR
Chris Nelder, RMI

Britta Gross, RMI
Shenshen Li, RMI
Lynn Daniels, RMI
Rhett Lawrence, Forth
Kelly Yearick, Forth
Eric Huang, Forth
Whit Jaimeson, Forth
Public Attendees and Comment Details

Team will share written public comment received a day prior to the meeting at the meeting:

Zechariah.HECK@odot.state.or.us

Share name in chat and “yes” if you intend to provide verbal public comment.
TEINA Modeling Results

• Oregon Transportation Electrification Goals Review
• Future Infrastructure Scenarios Recap
• Modeling Results by Use Case
  – Urban e-LDVs
  – Rural e-LDVs
  – Transit and School Buses
  – TNCs
Oregon Transportation Electrification Goals

Oregon light-duty Zero Emission Vehicle Goals in the Base Case (SB 1044)

- **2020**: 50,000 ZEVs
- **2025**: 250,000 ZEVs
- **2030**: 25% registered LDVs & 50% annual new ZEV sales
- **2035**: 90% annual new ZEV sales
Future Infrastructure Scenarios

**Base Case**
- Anticipates life as if the pandemic never happened
- Proxy for what “business as usual” might have been

**Rapid Recovery**
- Economy returns to previous vigor by the end of 2021
- Anticipates herd immunity to the pandemic is achieved sometime in 2021
- Proxy for an optimistic outlook

**Slow Recovery**
- Economic activity remains depressed through the end of 2024
- Anticipates difficulty in achieving herd immunity to the pandemic
- Proxy for a pessimistic outlook
Modeling Methodology Overview

Step 1: Vehicle Forecast
Project OR total number of registered vehicles (or VMT) for each use case and each scenario

Step 2: ZEVs Forecast
Project OR total number of ZEVs (or electric VMT) for each use case and each scenario

Step 3: Chargers Assessment
Evaluate charging infrastructure need to support ZEV adoption for each use case and each scenario

Step 4: Disaggregation
Allocate the chargers to county or census tract level for each use case and each scenario
Modeling Results by Use Case
Urban e-LDVs Infrastructure Need

Shares of Different Chargers

<table>
<thead>
<tr>
<th></th>
<th>BAU</th>
<th>Slow Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workplace L2</td>
<td>55%</td>
<td>45%</td>
</tr>
<tr>
<td>Public L2</td>
<td>33%</td>
<td>35%</td>
</tr>
<tr>
<td>DCFC</td>
<td>12%</td>
<td>20%</td>
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</table>

Key Metrics by 2035

- **ZEVs**
  - L2 Port: 25 ~ 35
  - DCFC: 100 ~ 200

- **People**
  - L2 Port: 40 ~ 70
  - DCFC: 300 ~ 400
Rural e-LDVs Infrastructure Need

Shares of Different Chargers

<table>
<thead>
<tr>
<th></th>
<th>BAU</th>
<th>Slow Recovery</th>
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</thead>
<tbody>
<tr>
<td>Workplace L2</td>
<td>40%</td>
<td>32%</td>
</tr>
<tr>
<td>Public L2</td>
<td>31%</td>
<td>33%</td>
</tr>
<tr>
<td>DCFC</td>
<td>28%</td>
<td>35%</td>
</tr>
</tbody>
</table>

Key Metrics by 2035

- **ZEVs**
  - L2 Port: 15 ~ 25
  - DCFC: 35 ~ 45

- **People**
  - L2 Port: 50 ~ 60
  - DCFC: 100 ~ 150
Urban & Rural e-LDVs
Infrastructure Distribution By Census Tract
(DCFC in BAU Scenario)
Transit And School Buses Infrastructure Need

Shares of Different Chargers

<table>
<thead>
<tr>
<th>BAU by 2035</th>
<th>BAU by 2035</th>
</tr>
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<tbody>
<tr>
<td>School Bus L2</td>
<td>85%</td>
</tr>
<tr>
<td>Transit Bus DCFC</td>
<td>28%</td>
</tr>
<tr>
<td>School Bus L2</td>
<td>90%</td>
</tr>
<tr>
<td>Transit Bus DCFC</td>
<td>10%</td>
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</tbody>
</table>

Key Metrics by 2035 (BAU)

- School buses/L2 Port: 1
- Transit buses/Bus DCFC: 2
- Students/L2 Port: ~ 90
- People/Bus DCFC: ~ 400
Buses Infrastructure Distribution
(DCFC in 2020 Fast Recovery)
Today in Oregon, TNC demand is treated as part of the public charging demand, so no TNC-dedicated stations have been announced yet.

Key Metrics by 2035 (BAU)

- 44% electricity comes from home chargers
- ZEV/DCFC = 15

Synergy is the key!
Questions & Discussion
Listening Sessions

- EV Drivers and Advocates
- Transit Agencies and Providers
- EV Service Providers
- Micro-mobility Company Representatives
- Rural Representatives
- Workplace Charging Venues
- Transportation Networking Companies
- Freight/Delivery Representatives
- Historically Underserved Community Representatives
- Developers, Multi-unit Dwelling (MUD) Owners, Property Managers
- Farming/Ranching Representatives
- Original Equipment Manufacturers and EV Dealers
Five Key Themes

Upfront Costs
The costs associated with the vehicles, electrical upgrades, and chargers can be a barrier to adoption.

Charging at Multi-Unit Dwellings
MUD residents need to experience the benefits of convenient, reliable, and affordable charging to accelerate adoption.

Public Charging Network
A functional statewide public charging network combined with well-defined, visible signage will create awareness of charging locations, make longer trips possible, help combat range anxiety, and accelerate EV adoption.

Public Charging User Experience
Creating a more positive and equitable user experience at public charging stations is important.

Availability of Vehicle and Equipment
Transit agencies, school districts, farmers, and freight operators are unable to exclusively adopt EVs now due to lack of or limited supply of EVs and equipment.
Individual Sessions

EV Drivers and Advocates
• Address range anxiety
• Standardized charging/user experience

Transit Agencies and Providers
• Lack of equipment
• High upfront costs

EV Service Providers
• Streamline permitting processes
• Difficulties with installing at MUDs
• Address demand charges

Micro-mobility Company Representatives
• Policies supporting safety; safe road conditions
• Secured storage and parking
Individual Sessions (cont.)

Rural Representatives
- Ability to travel long distances
- Availability of EV trucks and SUVs

Workplace Charging Venues
- Keeping up with demand is challenging – but future need is uncertain (Work-at-home long-term)
- Employees overstaying time on chargers

Transportation Networking Companies
- Issues at charging stations – broken chargers, faulty card readers, queues
- More chargers needed where people gather – retail, grocery stores

Freight/Delivery Representatives
- Charging and power capacity
- High costs of vehicles and infrastructure
Individual Sessions (cont.)

Historically Underserved Community Representatives
- Charging access for MUD residents
- Education and awareness

Developers, Multi-unit Dwelling (MUD) Owners, Property Managers
- Retrofit challenges/high costs
- EV-ready incentives

Farming/Ranching Representatives
- Reliability and charging time
- Cost-effectiveness

Original Equipment Manufacturers and EV Dealers
- Incentives/rebates drive adoption
- Range anxiety
Overview of Policy Recommendations for TEINA Advisory Group
Policy Categories

Enable
Policies that remove barriers to deployment of electrification infrastructure with the lowest difficulty of execution and implementation for the State of Oregon and other entities in the near term. This will enable local jurisdictions and key stakeholders to implement charging infrastructure.

Accelerate
Policies that could speed up the deployment of electrification infrastructure with medium difficulty of execution and implementation for the key players over the medium term. This will allow the State to put in place a conducive environment for charging infrastructure deployment and give other entities the time to develop the appropriate systems.

Drive
Policies that might take longer or be more difficult to implement, but could rapidly accelerate the deployment of electrification when done. This will allow the State to influence charging infrastructure deployment at specific areas that local jurisdictions and the market will not be able to provide for.
Many players are active in expanding charging infrastructure.
Most players are acting separately.
No overall ZEV charging infrastructure strategy.

Important Relationships
- Oregon PUC actively driving transportation electrification plans of the IOUs.
- Forth is a critical connector between stakeholders, working closely with public utilities.
- ZEViWG and OEVC are coordinating bodies, with emphasis on state agencies.

This is not a comprehensive set of all stakeholders addressing infrastructure in transportation electrification.
Common Themes from Listening Sessions

- Upfront costs for both vehicles and charging infrastructure
- Charging at Multi-Unit Dwellings (MUDs)
- Statewide Public Charging Network
- Public Charging User Experience
- Availability of Vehicles and Equipment
Enable
Investigate and develop standards for consistent EVSE user experience, reliability, and redundancy

Theme(s) Addressed
Public Charging User Experience
Public Charging Network

Use Cases Impacted
Urban LDV
Rural LDV
Corridor LDV
Disadvantaged Communities
TNCs
Enable
State directs and incentivizes public utilities to use Clean Fuels revenue to fund public DCFCs and Level 2 EVSE in areas with relatively high population densities.

**Theme(s) Addressed**
- Upfront Costs
- Public Charging Network
- User Experience

**Use Cases Impacted**
- Urban LDV
- Rural LDV
- Corridor LDV
- Disadvantaged Communities
- TNCs
Enable

State directs and encourages Public Utility Commission (for IOUs) and public utilities/their governing bodies to pursue additional DCFC deployment through innovative rate design that mitigates demand charge impacts

Theme(s) Addressed
- Upfront Costs
- Public Charging Network
- Public Charging User Experience

Use Cases Impacted
- Rural LDV
- Corridor LDV
- Long Haul Trucking
**Accelerate**
State incentives for public EVSEs

**Theme(s) Addressed**
- Upfront Costs
- Public Charging Network
- Public Charging User Experience

**Use Cases Impacted**
- Urban LDV
- Rural LDV
- Disadvantaged Communities
- TNCs
Accelerate
State adoption of long-term EV-readiness requirements and Reach Codes for local municipalities

**Theme(s) Addressed**
Charging at Multi-Unit Dwellings

**Use Cases Impacted**
Urban LDV
Disadvantaged Communities
Micromobility
**Drive**

State funds infrastructure deployment on State-owned property

<table>
<thead>
<tr>
<th><strong>Theme(s) Addressed</strong></th>
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<tbody>
<tr>
<td>Upfront Costs</td>
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<tr>
<td>Public Charging Network</td>
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<td>Public Charging User Experience</td>
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<th><strong>Use Cases Impacted</strong></th>
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<td>Corridor LDV</td>
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<tr>
<td>Disadvantaged Communities</td>
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<tr>
<td>Local &amp; Commercial Industrial Vehicles</td>
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<tr>
<td>Transit/School Buses</td>
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<tr>
<td>Long Haul Trucking</td>
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</tbody>
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Drive

Require X% of parking spaces be EV-ready by 202x

Theme(s) Addressed
Charging at Multi-Unit Dwellings

Use Cases Impacted
Rural LDV
Disadvantaged Communities
TNCs
<table>
<thead>
<tr>
<th></th>
<th>Urban LDV</th>
<th>Rural LDV</th>
<th>Corridor LDV</th>
<th>Disadvantaged communities</th>
<th>Local commercial &amp; industrial vehicles</th>
<th>Transit &amp; school bus</th>
<th>TNCs</th>
<th>Long-haul trucking</th>
<th>Micro-mobility</th>
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<td>Consistent EVSE user experience &amp; reliability/redundancy</td>
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<td>✓</td>
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<td></td>
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<tr>
<td>State encourage utilities develop rates to mitigate demand charge impacts on DCFCs</td>
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<tr>
<td>State incentivizes public utilities to use Clean Fuels revenue to support or fund public DCFCs and Level 2 EVSE</td>
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<td>State provides funding or low/no interest financing for public EVSEs</td>
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<td>State adoption of long-term EV-readiness requirements &amp; Reach codes</td>
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<td>Require certain % of parking spaces to be EV-ready by 202x</td>
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Breakout Sessions

What are your reactions to the list of policy recommendations you’ve been presented with? What’s missing from that list overall, and what is problematic?

- How about your specific use cases? What else should be included to address those specific needs (within the scope of what TEINA can do)?
Public Comment
Next Steps

Provide any additional comments on policy recommendations *by March 15*

Next (last) AG Meeting *on May 11*
- Review Draft Final Report